

What is claimed is:

1. A shaft coupling comprising two axially opposed rotary members having rotation axes that can be positioned so as to be parallel to and not aligned with each other, said rotary members having axially opposed surfaces axially facing each other, each of said axially opposed surfaces being formed with a plurality of guide grooves each axially facing and extending perpendicular to one of the guide grooves formed in the other of said axially opposed surfaces, rolling elements each disposed between a pair of axially facing guide grooves at a portion where the pair of axially facing guide grooves cross each other so as to roll while being guided by the pair of axially facing guide grooves, and a retainer for restricting movements of said rolling elements in a radial direction of said rotary members, whereby power is transmitted between said rotary members through said rolling elements.
2. The shaft coupling of claim 1 wherein said rotary members, said rolling elements and said retainer are made of a metallic material and have surfaces that are subjected to hardening treatment.
3. The shaft coupling of claim 1 or 2 wherein each of said guide grooves extends in a straight line in a longitudinal direction thereof.
4. The shaft coupling of claim 3 wherein each of said guide grooves extends at an angle of 45 degrees with respect to a radial direction of said rotary members.

5. The shaft coupling of claim 3 or 4 wherein said rolling elements are spherical members, and wherein each of said guide grooves has a plurality of surfaces that simultaneously contact the corresponding rolling element from both side of the guide groove with respect to the width direction of the guide groove.
6. The shaft coupling of claim 5 wherein each of said plurality of surfaces of each of said guide grooves is a curved surface having a radius of curvature greater than the radius of said rolling elements.
7. The shaft coupling of claim 5 wherein each of said plurality of surfaces of each of said guide grooves is a flat surface.
8. The shaft coupling of any of claims 5 to 7 wherein each of said guide grooves has a portion which does not contact the corresponding rolling element and defines a recess.
9. The shaft coupling of any of claims 1 to 8 wherein said rolling elements are spherical members, and wherein said retainer has curved contact surfaces which contact the respective rolling elements and have a radius of curvature greater than the radius of said rolling elements.
10. The shaft coupling of any of claims 1 to 8 wherein said retainer has flat contact surfaces which contact the respective rolling elements.
11. The shaft coupling of any of claims 1 to 10, surfaces of said guide grooves that are brought into contact with said rolling elements, surfaces of

said rolling elements and/or surfaces of said retainer that are brought into contact with said rolling elements are subjected one or a plurality of surface treatments selected from dry plating, wet plating, melting treatment, flame spraying, ion implantation, sulfidization, chemical conversion, surface heat treatment and shot peening to reduce the friction coefficient of these surfaces.

12. The shaft coupling of any of claims 1 to 11 wherein a lubricant is disposed between contact surfaces of said guide grooves and said rolling elements and/or between contact surfaces of said retainer and said rolling elements.

13. The shaft coupling of any of claims 1 to 12 further comprising an axial restrictor for restricting the axial distance between said rotary members within a predetermined range.

14. The shaft coupling of claim 13 wherein said axial restrictor comprises two restrictor members each provided on a surface of one of said rotary members that is opposite to the axially facing surface of said one of said rotary members and sandwiching said rotary members.

15. The shaft coupling of claim 14 wherein surfaces of said rotary members that are brought into said restrictor members and/or surfaces of said restrictor members that are brought into contact with said rotary members are subjected to one or a plurality of surface treatments selected from dry plating, wet plating, melting treatment, flame spraying, ion implantation, sulfidization, chemical conversion, surface heat treatment

and shot peening to reduce the friction coefficient of these surfaces.

16. The shaft coupling of claim 14 or 15 wherein a lubricant is disposed between contact surfaces of said rotary members and said restrictor members.

17. The shaft coupling of any of claims 14 to 16 wherein a sliding member is disposed between said rotary members and said restrictor members.

18. The shaft coupling of any of claims 14 to 17 further comprising means for making the distance between said restrictor members variable, whereby the force with which said rotary members are sandwiched between said restrictor members is adjustable.

19. The shaft coupling of claim 18 wherein said means is a thread coupling means through which said restrictor members are threadedly coupled together.

20. The shaft coupling of claim 18 further comprising an elastic member biasing each of said restrictor members against the axially opposed rotary member, thereby producing the force with which said rotary members are sandwiched between said restrictor members.

21. The shaft coupling of any of claims 14 to 17 wherein said restrictor members are fixed in position such that the distance therebetween is constant.

22. The shaft coupling of any of claims 14 to 21 further comprising a coupling member extending through guide holes each formed in one of said rotary members, said restrictor members being coupled together through said coupling member, and an elastic member mounted on an outer peripheral surface of said coupling member and/or elastic members each mounted on an inner surface of one of said guide holes.

23. The shaft coupling of claim 22 wherein said elastic member or elastic members are made of a material having high sliding properties.

24. The shaft coupling of claim 23 wherein said elastic member or elastic members are made of a material comprising a rubber matrix to which a fluorine material is added.

25. The shaft coupling of claim 12 or 16 wherein a lubricant is retained in the shaft coupling, the shaft coupling further comprising means for preventing entry of foreign matter into the shaft coupling from outside the shaft coupling.